

CLAIMS

We claim:

1 1. A method for browsing information on a display device of a hand-held
2 device, wherein the method comprises a virtual display being the display device of the hand-held
3 device, a viewpoint from which the virtual display is viewed and a virtual data object comprising
4 information to be viewed on the virtual display, wherein the method comprises the steps of:

5 coupling the display device to a digital processor;

6 mapping information content generated by the digital processor into the virtual
7 data object suitable for conveying information to the user of the hand-held device;

8 displaying a portion of the virtual data object at a time on the display device, the
9 virtual data object comprising characters, pictures, lines, links, video or pixels that can be
10 conveniently displayed on the display device at a time;

11 wherein information is browsed on the display device essentially in a mirror-like
12 way, the method further comprising the step of:

13 moving the portion of the virtual data object displayed on the display device in the
14 same direction as the hand-held device is tilted, whereby a certain orientation of the hand-held
15 device always displays the same portion of the virtual data object on the display device.

1 2. The method according to claim 1, wherein the method comprises the steps of:

2 setting a predefined xy-plane as a xy-plane;

3 determining a relation between the rotation degree around the x-axis and the y-
4 axis and the amount of the displacement of the portion on the virtual data object displayed on the
5 display device at a time;

6 displacing the position of the displayed portion of the virtual data object to the
7 right when the hand-held device is rotated essentially towards the positive rotation direction
8 around the y-axis;

9 displacing the position of the displayed portion of the virtual data object to the left
10 when the hand-held device is rotated essentially towards the negative rotation direction around
11 the y-axis;

12 displacing the position of the displayed portion of the virtual data object upwards
13 when the hand-held device is rotated essentially towards the positive rotation direction around
14 the x-axis;

15 displacing the position of the displayed portion of the virtual data object
16 downwards when the hand-held device is rotated essentially towards the negative rotation
17 direction around the x-axis; and

18 displaying the movement of the portion of the virtual data object on the display
19 device of the hand-held device according to the set relation.

1 3. The method according to claim 2, wherein the method comprises the step of:

2 changing the relation between the rotation degree around the x-axis and/or the y-
3 axis and the amount of the displacement of the portion on the virtual data object in proportion to
4 the distance between the viewpoint and the display device.

1 4. The method according to claim 1, wherein the movement of the portion of the

2 virtual data object displayed on the display device is proportional to the change amount and/or
3 rate of the rotational movement around the x-axis and/or y-axis.

1 5. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device into a zoom mode;
3 determining the distance between the viewpoint and the display device; and
4 zooming in or out the displayed information based on the determined distance
5 information.

1 6. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device into a zoom mode; and
3 zooming in or out the displayed information when rotating the hand-held device
4 around the axis being essentially perpendicular to the predefined xy-plane.

1 7. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device into a zoom mode; and
3 zooming in or out the displayed information when the hand-held device is tilted.

1 8. The method according to claim 1, wherein the information displayed on the
2 display device essentially depends on the location and orientation of the virtual display, the
3 viewpoint and the virtual data object.

1 9. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device surface level as an xy-plane;
3 determining a relation between the x-axial and/or y-axial movement of the hand-
4 held device and the amount of the displacement of the portion of the virtual data object displayed
5 on the display device at a time; and

6 moving the portion of the virtual data object displayed on the display device in the
7 same direction as the hand-held device is moved in the xy-plane according to the relation
8 information.

1 10. The method according to claim 1, wherein filtering the x-axial, y-axial and/or
2 tilting movements before displaying the movements on the display device.

1 11. The method according to claim 1, wherein changing the relation between the
2 rotation degree around the x-axis and y-axis and the amount of the displacement of the portion of
3 the virtual data object displayed on the display device at a time.

1 12. The method according to claim 1, wherein the method comprises the step of:
2 keeping the orientation of the information displayed on the display device
3 unchanged when rotating the hand-held device around the axis being essentially perpendicular to
4 the surface level of the hand-held device.

1 13. A hand-held device for browsing information,
2 wherein the hand-held device comprises a virtual display being the display device
3 of the hand-held device, the hand-held device comprising:
4 a digital processor (30);
5 a memory (60,70) coupled to the digital processor (30), the memory (60,70)
6 comprising a virtual data object suitable for conveying information to the user of the hand-held
7 device;
8 a display device (10) coupled to the digital processor (30);

means (30) for moving the portion of the virtual data object displayed on the display device in the same direction as the hand-held device is tilted, whereby a certain orientation of the hand-held device always displays the same portion of the virtual data object on the display device.

14. The hand-held device according to claim 13, wherein the hand-held device comprises:

means (30) for setting an xy-plane as a default xy-plane;
relation information (60) based on the rotation degree around the x-axis and y-axis and the amount of the displacement of the portion of the virtual display space displayed on the display device at a time;

means (30) for determining the rotation amount around the x-axis and/or y-axis;
and

means (30) for changing the location of the portion of the virtual data object displayed on the display device (10) based on the rotational amount around the x-axis and/or y-axis and the relation information (REL).

15. The hand-held device according to claim 13, wherein the hand-held device comprises means (30) for changing the relation information (60).

16. The hand-held device according to claim 13, wherein the hand-held device comprises:

means (30) for setting the display device into a zoom mode;

4 means (20,50) for determining the distance between the viewpoint and the display
5 device; and
6 means (30) for zooming in or out the displayed information based on the distance
7 information.

1 17. The hand-held device according to claim 13, wherein the hand-held device
2 comprises means (30) for zooming in or out the displayed information when rotating the hand-
3 held device around the axis being essentially perpendicular to the predefined xy-plane.

1 18. The hand-held device according to claim 13, wherein the hand-held device
2 comprises:

3 means (30) for setting the display device surface level as an xy-plane;
4 relation information (60) between the x-axial and/or y-axial movement of the
5 hand-held device and the amount of the displacement of the portion of the virtual data object
6 displayed on the display device at a time;

7 means (30) for determining the amount of displacement in the xy-plane; and

8 means (30) for moving the portion of the virtual data object displayed on the
9 display device (10) in the same direction as the hand-held device is moved in the xy-plane
10 according to the relation information (60).

1 19. The hand-held device according to claim 13, wherein the hand-held device
2 comprises means (30) for filtering the x-axial, y-axial and/or tilting movements before displaying
3 the movements on the display device (10).

1 20. The hand-held device according to claim 13, wherein the hand-held device
2 comprises means (30) for changing the relation (60) between the rotation degree around the x-
3 axis and y-axis and the amount of the displacement of the portion of the virtual data object
4 displayed on the display device (10) at a time.

1 21. The hand-held device according to claim 13, wherein the hand-held device
2 comprises means (30) for changing the relation (60) between the x-axial and/or y-axial
3 movement of the hand-held device and the amount of the displacement of the portion of the
4 virtual data object displayed on the display device at a time.

1 22. A computer program embodied on a computer-readable medium, wherein the
2 computer program executes the program steps recorded in a computer-readable medium to
3 perform a method for browsing information on a display device of a hand-held device, wherein
4 the method comprises a virtual display being the display device of the hand-held device, a
5 viewpoint from which the virtual display is viewed and a virtual data object comprising
6 information to be viewed on the virtual display, wherein the method comprises the steps of:

7 coupling the display device to a digital processor;

8 mapping information content generated by the digital processor into the virtual
9 data object suitable for conveying information to the user of the hand-held device;

10 displaying a portion of the virtual data object at a time on the display device, the
11 virtual data object comprising characters, pictures, lines, links, video or pixels that can be
12 conveniently displayed on the display device at a time;

wherein in the method information is browsed on the display device essentially in a mirror-like way, the method further comprising the step of:

moving the portion of the virtual data object displayed on the display device in the same direction as the hand-held device is tilted, whereby a certain orientation of the hand-held device always displays the same portion of the virtual data object on the display device.

23. The computer program according to claim 22, wherein the computer program executes the steps of:

setting a predefined xy-plane as a xy-plane;

determining a relation between the rotation degree around the x-axis and the y-axis and the amount of the displacement of the portion on the virtual data object displayed on the display device at a time;

displacing the position of the displayed portion of the virtual data object to the right when the hand-held device is rotated essentially towards the positive rotation direction around the y-axis;

displacing the position of the displayed portion of the virtual data object to the left when the hand-held device is rotated essentially towards the negative rotation direction around the y-axis;

displacing the position of the displayed portion of the virtual data object upwards when the hand-held device is rotated essentially towards the positive rotation direction around the x-axis;

16 displacing the position of the displayed portion of the virtual data object
17 downwards when the hand-held device is rotated essentially towards the negative rotation
18 direction around the x-axis; and
19 displaying the movement of the portion of the virtual data object on the display
20 device of the hand-held device according to the set relation.

1 24. The computer program according to claim 22, wherein the computer program
2 executes the step of:

3 changing the relation between the rotation degree around the x-axis and/or the y-
4 axis and the amount of the displacement of the portion on the virtual data object in proportion to
5 the distance between the viewpoint and the display device.

1 25. The computer program according to claim 22, wherein the movement of the
2 portion of the virtual data object displayed on the display device is proportional to the change
3 amount and/or rate of the rotational movement around the x-axis and/or y-axis.

1 26. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device into a zoom mode;
4 determining the distance between the user of the hand-held device to the display
5 device; and
6 zooming in or out the displayed information based on the determined distance
7 information.

1 27. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device into a zoom mode; and
4 zooming in or out the displayed information when rotating the hand-held device
5 around the axis being essentially perpendicular to the surface level of the hand-held device.

1 28. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device into a zoom mode; and
4 zooming in or out the displayed information when the hand-held device is tilted.

1 29. The computer program according to claim 22, wherein the information displayed
2 on the display device essentially depends on the location and orientation of the virtual display,
3 the viewpoint and the virtual data object.

1 30. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device surface level as an xy-plane;
4 determining a relation between the x-axial and/or y-axial movement of the hand-
5 held device and the amount of the displacement of the portion of the virtual data object displayed
6 on the display device at a time; and
7 moving the portion of the virtual data object displayed on the display device in the
8 same direction as the hand-held device is moved in the xy-plane according to the relation
9 information.

1 31. The computer program according to claim 22, wherein filtering the x-axial, y-
2 axial and/or tilting movements before displaying the movements on the display device.

1 32. The computer program according to claim 22, wherein changing the relation
2 between the rotation degree around the x-axis and y-axis and the amount of the displacement of
3 the portion of the virtual data object displayed on the display device at a time.

1 33. The computer program according to claim 22, wherein the computer program
2 executes the step of:

3 keeping the orientation of the information displayed on the display device
4 unchanged when rotating the hand-held device around the axis being essentially perpendicular to
5 the surface level of the hand-held device.